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TECHNOLOGY
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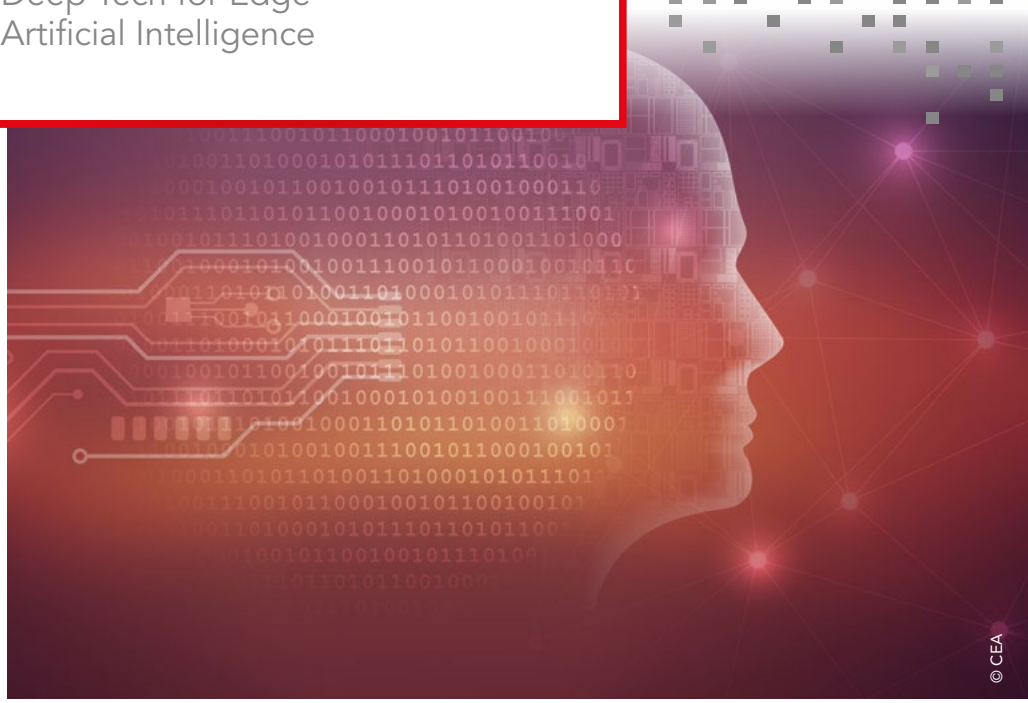
PRESS KIT

Leti Innovation Days 2019
Deep Tech for Edge
Artificial Intelligence



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INSTITUT CARNOT Leti

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From Software to Hardware.

Artificial intelligence is no longer an abstract concept, it already fuels our everyday life with communication tools (e.g Google 'Smart Compose' feature, Siri, etc). Tomorrow, AI will play a greater and perhaps a more important societal role, predicting and assessing our health risks, providing customer support, easing trafic congestion. Cars will be packed with AI features, including speech and gesture recognition, eye tracking, and so on. Some of these applications will require unprecedent responsiveness (e.g. breaking systems). In such a context, the Cloud only will not do. Artificial Intelligence will also need to be supported locally, meaning at the Edge.

Algorithms will need to be processed locally, directly on the hardware device. Connection to the Cloud or anykind of networks won't be necessary, systems will be fully independent, able to process data and take decisions by themselves. Because systems will be able to operate independently, cybersecurity will be reinforced.

However, this won't happen without improvements of hardware components and technologies, including computation and memories. Integrating both memories, computation and sensors on the chip is now vital to avoid back and forth with external blocks and treat the data within. To keep up with the AI race, microelectronics researchers are asked to pioneer quick and reliable solutions, combining both performance and energy efficiency.

NEW AI COMPUTING IN CONSUMER ELECTRONICS

The advent of artificial intelligence (AI) will require diverse new microelectronic solutions to meet the evolving demands of large-scale data centers, "mid-size" systems like autonomous vehicles and robots, and a growing array of mobile devices, appliances, wearables, and as-yet un-envisioned applications. Of central importance is the need to achieve unprecedented efficiency and speed in the collection and analysis of data, while also managing power consumption and form factor.

In the hardware domain, this will require innovative thinking and new paradigms in sensors, processors, memory, interconnection, and packaging. Promising options are beginning to materialize from established and emerging research efforts, which we will review in the context of Edge AI and other broad trends. Going forward, interdisciplinary pre-industrial collaboration will be needed to create practical, manufacturable solutions from these efforts.

We can envision the coming AI marketplace by comparing applications based on computing capability and power consumption requirements (Figure 1). Wearables have the greatest power restrictions and (in relative terms) lowest computing needs. Data centers are at the opposite end, with smart appliances, augmented reality, robots, and autonomous vehicles in between.

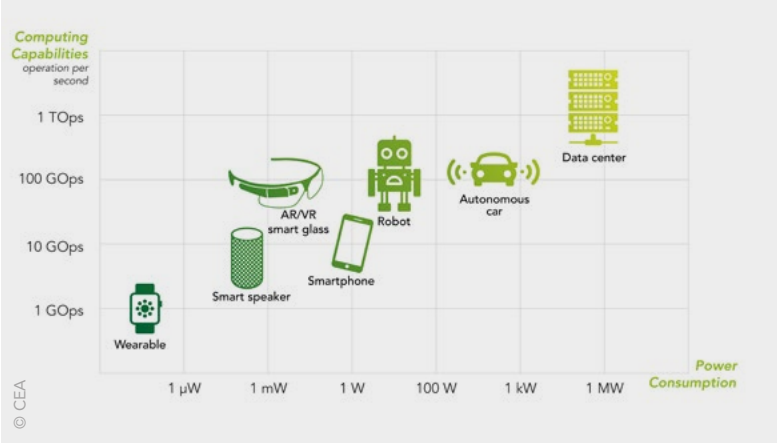


FIG.1
Evolving demand & market

Edge AI, in which most data analysis takes place at the point of collection, is well-suited to applications on the left-hand side. While this is simple to describe, it requires unprecedented levels of sensor and processor capability in extremely small packages. Sensors will need to take inspiration from human eyes and ears, becoming far more adaptable by changing their characteristics (such as dynamic range) based on cognition and local intelligence.

Larger-scale applications, meanwhile, will strain traditional computing paradigms, particularly constant memory read/write cycles that consume both time and energy.

With these requirements in mind, CEA-Leti has prioritized research into smart sensors and innovative computing approaches. One focus is a fundamental problem of modern computing: moving data between memory and processor now costs vastly more than computation, both in time and energy consumption. Data transfer and memory access account for up to 90% of system energy usage, and because applications like artificial neural networks rely on large databases and simple computation operations, reducing data movement becomes critical.

"By the 2020s, in- memory-computing processors can provide 100 times the throughput of conventional processors on AI applications while maintaining the same frequency and energy budget"

said M.Tchagaspanian, CEA-Leti EVP

IMPROVING MEMORIES FOR SMART AND POWER-EFFICIENT OPERATION

The oncoming wave of AI will require the capabilities of both innovative neural networks with direct connection to sensor outputs and in-memory computing. Both will leverage novel applications of nonvolatile memories for smart and power-efficient operation, and the two can be combined to enhance and enable the development of smart speakers, smart glasses, and a vast range of other new AI-oriented devices.

CEA-Leti's efforts in these two areas aim for maximum compatibility with existing technologies, following the institute longtime philosophy of using readily available processes, materials, and design approaches to ease the transition into volume manufacturing.

Stacking of memory onto processors, to shorten the physical links, is the subject of long-standing CEA-Leti research into 3D circuitry. The institute is also pursuing new memory designs, which allow addition, subtraction, and Boolean logic to be performed within SRAM. The area cost is negligible and, more important, data never leaves the memory. These in-memory-computing (IMC) processors have strong potential for applications like neural networks and cryptography.

Going forward, on-die integration of resistive non-volatile memories (NVMs) like OxRAM and PCRAM in close proximity to CMOS operators are being pursued, to minimize data movement, and even the merging of memory and processing elements to create hybrid operators—an approach that would allow analog computation.

It's important to note that these approaches are not general purpose computing solutions. But they have great promise as a flexible low-cost add-on to classical processors, with drastically improved performance and energy efficiency in certain applications.

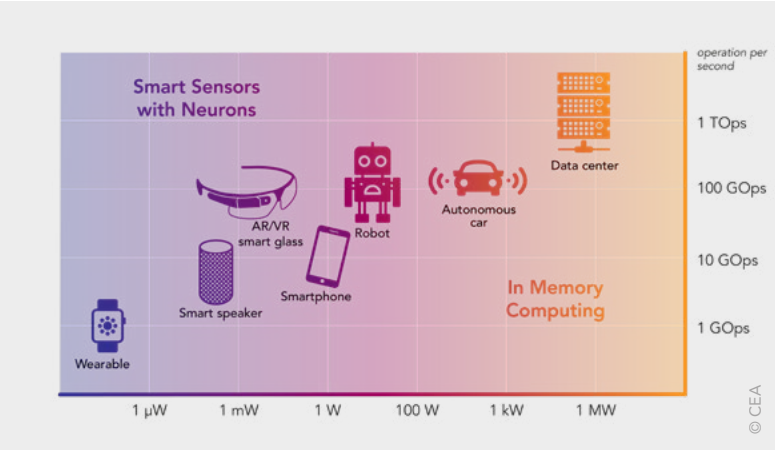


FIG.2
Two key technologies with NVM

Emulating the structure of brain synapses enables a "neuromorphic" approach to data processing in which many values can be probabilistically weighted and then combined to create a weighted output and subsequent activation function. Research suggests that resistive RAM (RRAM), including phase-change memory (PCM), can be used in this manner. This architecture lends itself to rapid assessment and classification of incoming information, with early experiments showing success at recognizing handwritten digits. Moreover, the concept could be an excellent fit for real-time processing needs, as has been shown in many proven experiments in applications like autonomous vehicles.

DEEP NEURAL NETWORKS: THE MOST ADVANCED FORM OF AI

Another promising line of inquiry is the use of spike-coding for deep neural network processing of sensor inputs, which eliminates the need for digitization of data. By keeping incoming sensor data (such as pixel brightness) in the form of analog voltage spikes rather than binary digits, this approach simultaneously reduces computing complexity and power consumption while maintaining natural spatial and temporal parallelism. Critically, this allows tailoring of performance against computing time, so devices can be optimized for specific applications.
These spiking neural networks will require massively parallel synaptic memories, which again can utilize NVMs (including RRAM).

SPIRIT

A proof-of-concept circuit, SPIRIT, has been successfully fabricated and shown effectiveness in several image-recognition applications. Developers used the open-source N2D2 CAD framework to design SPIRIT, which is the first neuromorphic device to co-integrate CMOS and OxRAM, and commercialization efforts are underway. A follow-on project will boost capacity with an eye towards use in classification of light detection and ranging (LIDAR) data.

Demo available on the showfloor

Grenoble, France's sweet spot for AI.

3IA INSTITUTE FOR ARTIFICIAL INTELLIGENCE LAUNCHED IN GRENOBLE

Grenoble has been selected and branded as one of France's four "best cities for artificial intelligence" by both the government and an international jury. The project brings together many partners from research and academic settings and from local companies of all sizes to further scientific excellence and build French and European offerings around artificial intelligence. Amongst partner companies and institutes that are established on the "Presqu'île" (Grenoble's scientific area) are ST Microelectronics and Schneider, as well as Inria (French National Institute for Computer Science and Applied Mathematics), the University of Grenoble-Alpes, and Grenoble INP.

More specifically, the 4-year 54 billion euro budget will enable all interdisciplinary stakeholders to undertake a number of public-private collaborative projects focusing on dedicated topics. It will also finance 28 chairs for research excellence in seven fields, including onboard intelligence, health, industry 4.0, environmental and energy concerns, or societal issues.

CEA-Leti will be actively participating in these four chairs, namely to push back neuromorphic engineering constraints for AI, better help patients manage their treatments, or optimize telecommunication networks.

Leti's new tech for industry.

NEW FRONTIERS FOR HEALTHCARE

Whether it's used to detect rare diseases or help doctor with diagnosis, artificial intelligence is gaining a growing interest in healthcare, from the surgery room to doctor's offices. CEA-Leti provides industrial partners with differentiating technologies that support AI-powered healthcare systems for health monitoring, diagnosis and treatment. Leti participates along the whole value chain by delivering components, system elements and clinically validated complete systems to its industrial partners, according to their needs.

diabeloop

Diabeloop's automated type-1 diabetes management system

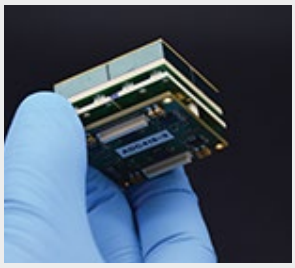
Type-1 diabetes, an autoimmune disease, affects several million people worldwide. More than half of the cases of type-1 diabetes are diagnosed before the patient's 20th birthday. Diabeloop, working in partnership with Leti, has been committed to improving the quality of life of type-1 diabetes patients and their loved ones since 2015.

What Diabeloop does: Diabeloop's first product, the DBLG1 System, was unveiled at CES last year. It virtually completely automates type-1 diabetes management by reproducing the pancreatic function destroyed by the disease. Consisting of powerful algorithms integrated into a secure terminal, this integrated system continuously measures blood sugar using a subcutaneous sensor, and delivers insulin via a subcutaneous pump.

Diabeloop continues to pursue an ambitious R&D roadmap to address other types of diabetes while gradually ramping up efforts to commercialize its first-generation product, the DBLG1 System, in Europe and the United States.

WHAT'S ON THE SHOWFLOOR

From microfluidic to Gamma Ray, CEA-Leti develops various technologies to improve access and diagnosis. Discover CEA-Leti's latest demonstrations on the showfloor:



Hispect

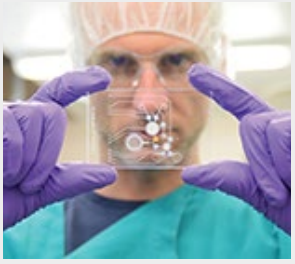
Significantly improving spatial and energy resolution for gramma-ray imaging devices

Lens-free Imaging

Tracking more than 10,000 biological microscopic objects at a time per image

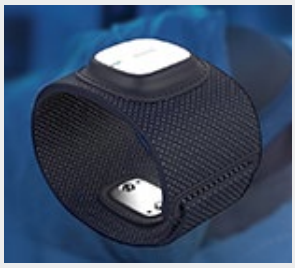
Stress Observer

Real-time stress monitoring system providing customized recommendations for stress-free travel



FlowPad

Generic toolbox for microfluidics and point-of-care diagnosis

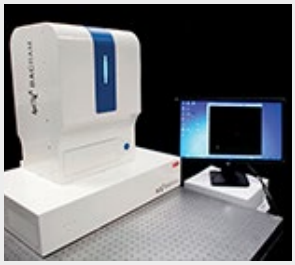


ApneaBand

Home sleep-apnea tracking wristband combining comfort and medical accuracy

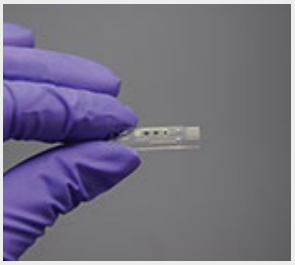
Relax

Wearable certified-ready medical device to measure and monitor brain activity outside a clinical environment



Bacram

The first compact and culture-free technology that identifies microorganisms in less than 15 min



Electrochemical micro-sensors

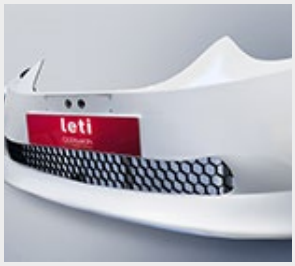
Electrochemical micro-sensor devices offering real-time information on complex environments

MAKING OUR GROWING CITIES MORE LIVEABLE

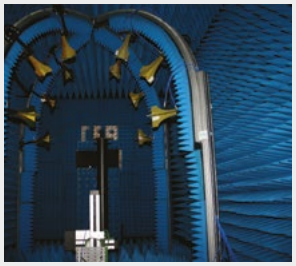
Making our growing cities more liveable is one of the major challenges currently facing society. Smart cities leverage technology to provide citizens with greater comfort and convenience and improve efficiency while minimizing environmental impacts.

WHAT'S ON THE SHOWFLOOR

Discover a few solutions tailored by CEA-Leti, available on the event show floor:

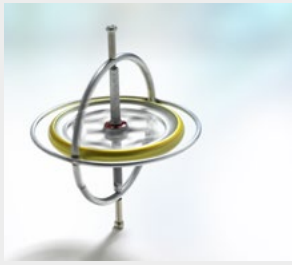


Sigma Fusion
Safely driving autonomous transportation with low power sensor fusion solution

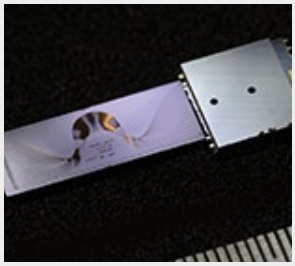


5G OTA
Testing and measuring millimeter waves for industrial applications

Pixcurve
Curving optical components to reduce component size and achieve higher level of performance/ compensation



M&NEMS Gyroscope
M&NEMS gyroscope integrating electronic board, lock-in amplifier, source, oscilloscope and rotating table



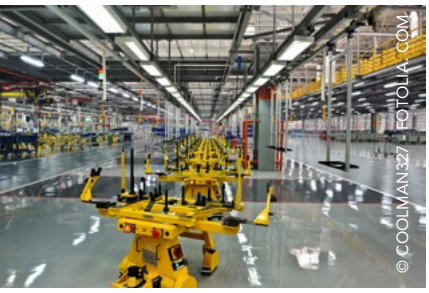
µPAsense
A compact photoacoustic sensor (MIR) that detects various gas with very high sensitivity down to a few ppb level

Shape Capture
Structural monitoring leveraging MEMS : A deformations and vibrations can now be monitored with an accuracy of 0.1 mm/m

Sigma-Cells
All-in-one inverter, charger and advanced battery management system for e-mobility

SMART INDUSTRY: FUELING INNOVATION TO BUILD THE FACTORY OF THE FUTURE

Smart industry are digital, functional, flexible, and profitable, making it a key factor in business performance. CEA-Leti introduces a number of solutions for the factory of the future that leverage digital technologies, connectivity, automation, data processing, Big Data, and IoT, driving the new industrial revolution that is now solidly underway.

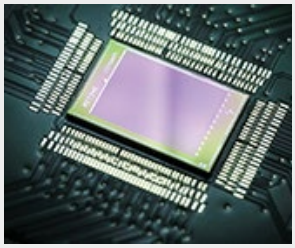


CEA-Leti 's Precise Localization Technology Boosts Quality Control and Efficiency in Desoutter's products

New indoor-location system that enables factories to monitor tools in real time and help manage their use by workers to improve efficiency, safety, security and quality control on assembly lines.

C.F. Announcements
Demonstration available on the showfloor in the Titane Room

WHAT'S ON THE SHOWFLOOR



Retina
Programmable vision chip enabling high frame rate and low latency image analysis

P-SCAN
Latest low-cost test bench that performs security assessment of a wide range of IoT products

Spirit
Spiking neural networks enabling massively parallel, low-power & low-latency computation

NeoLED
Compact, low-cost & long-lifespan, distributed-switch Leds

Cogito
Low-cost, easy-to-implement cybersecurity tool

HYLOC
Evaluating the latest hybrid data fusion algorithms for precise, resilient multimodal localization and motion tracking

THz Imaging
New array detectors in the THZ waveband leveraging antenna-coupled microbolometers

CEA-Leti's deep tech startup

© CARBALLO / FOTOLIA.COM

Originating in Leti-led research projects, Soitec and Sofradir are numbered among French flagship companies today. Looking only at intermediate-sized enterprises, Soitec and Sofradir, these employ more than a thousand people and work on high-tech, internationally competitive technologies. Leti spins off up to five start-ups every year. The Institute's start-up alumni network includes companies like Soitec, Sofradir, Ulis, Tronics, Movea—the oldest—and Aledia, Avalun, iskn, eLichens and MOOVLAB—the youngest. Leti has lanched 65 startups so far, including 18 within the past five year, as part of the startup program created in 2013.

SUCCESS STORIES

The successful initial public offering of Kalray Inc. in June underscores the strength of Leti's spins off.

Kalray, a pioneer in processors for new intelligent systems that was spun out of Leti in 2008, raised €43.5 million ($50.3 million) in France's largest IPO since 2012 on the Euronext Growth market.

In recent years, a dozen Leti startups have raised an average of €3 million ($3.5 million) in first-round venture backing. Aledia, a developer and manufacturer of next-generation 3D LEDs for display applications based on its gallium-nitride-nanowires-on-silicon platform, recently raised third-round investment of €30 million ($36 million), with Intel Capital as a new investor. Aledia was launched in 2011.

Recent funding events for Leti startups include:

- eLichens, founded in 2014 as a designer of patented gas sensors and the first comprehensive air-quality analysis and prediction platform: €7 million ($8 million)
- Diabeloop, founded in 2012 to develop an artificial pancreas to improve treatment of patients with type 1 diabetes: €13.5 million ($15.6 million)

WHAT'S NEW WITH CEA-LETI START-UPS

Available on the showfloor are 7 CEA-Leti start-up and 6 projects under incubation.
A few examples are:

Scintil Photonics: Towards faster, more affordable optical interconnect

CEA-Leti latest Startup "Scintil Photonics", has set the ambitious goal of developing competitively-priced optical interconnects capable of achieving transmission speeds of 800 Gbit/s. The company, a Leti spinoff currently in incubation, won the Bpifrance i-lab competition in 2018. It was founded by Leti research scientist Sylvie Menezo and former Tronics CEO Pascal Langlois.

Scintil Photonics is leveraging Leti research that led to the integration of lasers into III-V semiconductor materials on silicon circuits. The mass fabrication of lasers on silicon reduces circuit cost, size, and energy consumption. The company has completed several demonstrator systems and is currently in talks with several foundries with a view to prototyping and, ultimately, manufacturing its 800G circuits.

Aledia to strike out on their own

Also presenting on the showfloor is Aledia. Aledia has been housed within CEA infrastructures for seven years. Today, the company is investing €20 million in a 4,000 sq. m facility in Echirolles, near Grenoble. The new facility, which will be equipped with Aledia's own machines, will be dedicated to R&D as Aledia prepares to launch production within the next two years.

Compared to the OLEDs and liquid crystals in today's displays, Aledia's silicon nanowire LEDs offer higher brightness and energy efficiency and generate the three basic colors from a single chip. These advantages position Aledia to penetrate some huge markets, including smartphones. The market is so big that if just 20% of smartphone displays switched to LED technology, the manufacturing capabilities required would surpass those of TSMC, the world's leading semiconductor manufacturer.

To gear up for volume manufacturing, Aledia, which currently has 90 employees, is moving to Echirolles, near Grenoble. The company's primary objective is to speed up R&D to rapidly align its products with customer specifications. At the same time, Aledia is starting to work with a foundry with a view to launching production within two years. For the past seven years, Aledia has been housed at MINATEC Entreprises, where it was able to grow without making substantial investments in equipment, most notably by using the CEA's facilities. The company is leaving MINATEC Entreprises, but will stay in the Grenoble area. Aledia also plans to build 1,400 sq. m of cleanrooms at its new site. The Grenoble microtechnology startup scene has not seen a project of this scale in years.

Mag4Health: Towards Low Cost Magnetoencephalography

Currently under incubation, CEA-Leti's Mag4Health Biomagnetic imaging solution dramatically improves brain and heart biomagnetic imagery, while cutting costs of MagnetoEncephaloGraph (MEG) devices. Preliminary developed for the European Space Agency, Mag4Health solution is based on a disruptive quantum technology. It helps:Measuring the magnetic fields leveraging a laser and 100 billion of atoms, acting like small magnets, to quantify the magnetic field:

- Delivering images or bio magnetic activity
- of brain or heart
- Operating at ambient temperature
- No maintenance required

APPENDIX

BIOGRAPHIES

Emmanuel Sabonnadiere, CEA-Leti CEO

Since November 20th, 2017, Emmanuel Sabonnadiere is appointed CEO of the Leti of CEA Tech. Before, he was in charge of the Industrial Partners of CEA Tech.

Previously, Emmanuel Sabonnadiere was CEO of the Business Group Professional of Philips Lighting based in Amsterdam (NL). From 2008 till 2014, he was CEO & Chairman of General Cable Europe based in Barcelona (Spain). Emmanuel Sabonnadiere was CEO of NKM Noell at Wurzburg (Germany) from 2005 till 2008. He was vice-president of the Distribution Transformers division of Alstom T&D for 5 years. He began his career in 1992 with Schneider Electric holding various positions including that of Managing Director of development for equipment units.

Emmanuel Sabonnadiere has a strong technological background combined with a successful business track record over decades. With 25+ years of executive leadership of large operations, he had produced successful operating Result and great Team building. He had gained a sound experience of change management in large multi-cultural matrix organizations in order to adapt to the new markets conditions and a strong knowledge of European and International environments. He designed and set-up Strategic Plans including innovation process. Emmanuel Sabonnadiere believes in operational excellence, innovations in technology, talents management and enthusiasm in leadership.

Emmanuel Sabonnadiere obtained a PhD in physics (France), and an engineering degree in Information Technology (France). He holds an MBA (France).

Emmanuel Sabonnadiere is a fully qualified instructor at the ski school in Les Ménuires, and member of the Advisory board of IAC.

Jean-Noel Patillon, CEA-List CEO

Dr. Jean-Noël Patillon is a graduate of Supélec Engineering School and holds a PhD degree in Solid State Physics from the Solid State Physics Lab of University Paris XI. From 1984 to 1996, he joins the LEP (Laboratoire d'Electronique Philips), and becomes the Optoelectronics group leader. In 1996, he joins Motorola Labs Paris and heads the "Broadband System and Technology" and "Molecular Electronics Research" labs, which address the fields of short range systems (WLAN, WPAN) and heterogeneous network, cognitive radio and SDR. He's involved in various projects such as @HOM, Broadway, UCAN, WINNER, PULSERS, FIREWORKS, E2R/E2RII, E3. In January 2009, he joins the French Alternative Energies and Atomic Energy Commission (CEA) and becomes the head of the CEA List institute's "Communication systems" lab, working on E2E and M2M communication systems and solution. He contributes to the setting up of the Nano-INNOV operation and the SystemX Technological Research Institute. He is appointed scientific director of the CEA List and assistant to the director of the CEA List Carnot institute in 2013. He is Acting Director of the CEA List Institute since September 2018.

Patrick Gros, Inria-Grenoble, CEO

Patrick Gros has been involved in research in the field of image analysis since 1990. He received his PhD degree from University of Grenoble - France in 1993.

In 2002, he founded a research group dedicated to multimedia indexing and retrieval. The key idea of the team was to gather specialists of various media and techniques (learning, databases, data analysis) in a unique team in order to cope with problem like multimodality and coupling between document description and indexing techniques. The group gathered 30 people coming from the various fields concerned by multimedia retrieval: image, video, sound, speech and natural language processing, statistics, machine learning and databases.

Since 2014, P. Gros has been the director of the Inria research center of Grenoble - Rhône-Alpes, France. Patrick Gros's research interests concern multimedia indexing and retrieval in very large collections with applications like copy detection, TV analysis, audiovisual information retrieval.

Erik Huneker, co-founder and CEO of Diabeloop

Erik Huneker is the co-founder and CEO of Diabeloop, a young company developing technological innovations for people with diabetes.

Erik Huneker previously spent 7 years in the medical devices field at GE Healthcare, where he managed the international localization business to a ten-fold growth in sales.

He started his professional career at Pechiney and Alcan, with 7 years of management positions in manufacturing, marketing and Lean in the US and in France.

Erik Huneker is a tech and science enthusiast dedicated to growing people within the Diabeloop team. He gets energized by listening to the feedback of the patients, and Diabeloop solutions' potential to improve their lives. Erik graduated from the Ecole Polytechnique.

APPENDIX

LETI IN BRIEF

Founded in **1967**

Creation of **60** start-ups

ISO 9001 certified since 2000

330 industrial partners (40% are SMEs and VSEs)

1,900 researchers

700 publications per year

250 thesis and post-doctoral students

315 M€ annual budget

2,760 patents held

8,500 m² of cleanroom space, 200 mm and 300 mm semiconductor production units

Based in **France** (Grenoble) with offices in the **USA** (Silicon Valley) and **Japan** (Tokyo)

50+ years of R&D for industrial innovation.

In 1957, an « integrated electronics » research group was formed at the CEA in Grenoble. It was tasked with the design and maintenance of nuclear reactor electronic systems and to a range of civil and military nuclear engineering needs. At that time, many integrated circuits were produced in American factories and this motivated Leti's integrated electronics group to develop its own transistor technology. In 1963, the Institute produced its first integrated circuit and, in 1966, it announced production of the first MOS transistor.

The CEA integrated electronics group became the « Laboratoire d'électronique et de technologie de l'information » (Leti) on October 10th,1967. Very quickly, Leti was organized to work and set up partnerships with industry. The Étude et fabrication de circuits intégrés spéciaux [design and production of special integrated circuits] subsidiary, known as Efcis, was founded in 1972. In 1982, it was integrated into Thomson Semiconducteurs, a company that merged with Italian SGS to form STMicroelectronics.

In 1976, Leti produced and installed the first French scanner at Grenoble's General Hospital.

Six years later, in 1982, the Institute completed construction of 6,000 m² of buildings, including 2,000 m² of cleanrooms, in response to development needs in microelectronics, infrared technologies and magnetometry. Initial developments in micro-electro-mechanical systems (MEMS), especially accelerometers, were achieved at this time. Leti lodged a first generic patent for silicon-based comb capacitive lateral micro-accelerometers.

Minatec was founded in 2006 around Leti's activity, the aim being to bring together academic research, R&D laboratories and industry. Minatec focuses on micro- and nanotechnologies, and constitutes a new model for the research-education-innovation « knowledge triangle ». Today, this model structures the formation of major French university campuses like Paris-Saclay and Giant (Grenoble).

APPENDIX

300 mm: CEA-LETI BRINGS STATE-OF-THE-ART TECHNOLOGY TO INDUSTRY

With Nano 2022 initiative funding, CEA-Leti will complete installation of its first wave of 30 pieces of 300 mm microelectronics equipment in 2019. The equipment will expand Leti's technological capabilities, positioning the institute to address tomorrow's innovations.

The Nano 2022 initiative, financed by the CEA, the Auvergne Rhône-Alpes Regional Council, and the French government via the Directorate General for Enterprise, is spectacular in scope and in terms of its budget. The equipment purchased under Nano 2022 will give Leti one of Europe's most advanced R&D cleanrooms in Europe. The most remarkable piece of equipment to be acquired is an ASML immersion lithography system.

300 mm technology to catch up with 200 mm within two years

The new equipment also aligns with several strategic priorities. The first is to possess equipment similar to what is used by industrial customers (300 mm). The second is to ensure the confidentiality of customers' R&D projects, something that requires a complete fleet of equipment. Finally, with the launch of the Substrate Innovation Center, Soitec will move a significant portion of its R&D activities to Leti. This world-class prototyping center will primarily develop new materials.

Around fifteen pieces of equipment will be installed in 2019, rounding out the institute's existing resources, and the development of 300 mm processes will begin. These tasks will be completed by special project teams made up of employees of the CEA, the equipment manufacturers, and subcontractors. The institute's 300 mm activities should catch up with 200 mm within two years.

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APPENDIX

PATENTS: CEA REMAINS VERY ACTIVE

France's National Industrial Property Institute (INPI) released its 2018 ranking of patent filers. The CEA held on to its fourth-place ranking, coming in just behind three industrial corporations (Valeo, PSA, and Safran) with 674 patent applications published. This was the CEA's best year ever with the exception of 2016 and 2017 (684 applications).

It is also important to point out that Grenoble-based research in micro and nanoelectronics fuels a large part of the CEA's patents—something that is not reflected in the INPI ranking. And the CEA's main industrial partners for this type of research are also very well ranked.

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ABOUT LETI

Leti is a technology research institute at CEA Tech and a recognized global leader in miniaturization technologies enabling smart, energy-efficient and secure solutions.Committed to innovation, its teams create differentiating solutions for Leti's industrial partners.

By pioneering new technologies, Leti enables innovative applicative solutions that ensure competitiveness in a wide range of markets. Leti tackles critical, current global issues such as the future of industry, clean and safe energies, health and wellness, safety & security…

Leti's multidisciplinary teams deliver solid micro and nano technologies expertise, leveraging world-class pre-industrialization facilities.

For more than 50 years, the institute has been building long-term relationships with its industrial partners providing tailor-made solutions and a clear intellectual property policy.

Leti, technology research institute
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